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Raemaekers, Daan; Bembom, Willem; Dresscher, Sarah; Koops, Astrid; van de Lagemaat, Esther

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University of Groningen (UG)
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Poststraat 6 NL-9712 ER
Groningen the Netherlands
gia@rug.nl www.rug.nl

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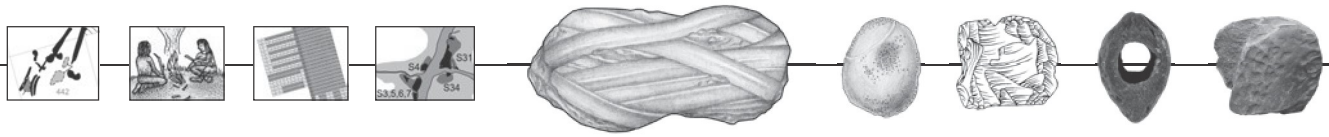

The ceramics

Raemaekers, D.C.M.[1], J.W. Bembom[2], S. Dresscher[3], A. Koops-Besijn[4] & E. van de Lagemaat[5]

3.1 Introduction

This chapter discusses the ceramics of Swifterbant S4. The analysis encompasses the ceramics found in 1974 and in the period 2005-2007. A total of 1626 sherds (c. 21.5 kg) were described using the descriptive system of Raemaekers (1999: appendix 1). Table 3.1 presents the different components of the assemblage.

In the first phase of the analysis, all sherds with a minimum weight of 5.0 g were described. The analysis of the pottery production was carried out by describing the wall thickness, temper, type of the joins and surface finish of the pottery and the technique, pattern and location of the decorations. The use was examined by describing the occurrence of food crusts and repair holes. Next, the vertical distribution of the sherds was examined to search for the presence of temporally distinguishable occupation phases. This section is of crucial importance, as ceramics provide the only key to unlocking possible relevant temporal units of analysis to use with respect to the other find categories. Another aim is to obtain a discernment of the functional differences among the Swifterbant sites. To this end, we compare the Swifterbant pottery of S2, S3 and S4.

3.2 General characteristics

Tempering agents

The pottery is tempered with different types of material (quartz, granite, other stones, plant, grog and bone) and in different combinations, resulting in 16 different tempering groups (table 3.2). Most of the sherds are tempered with two or more tempering agents (70.9%). Only 28.5% are tempered with a single material. Ten sherds have no visible temper. The most prevalent temper is a mix of some kind of stone grit and plant material (1105 sherds; 68.0%). In some instances, the type of stone was identified. The combination of granite and plant is found in 290 sherds; that of quartz and plant is present in 283 sherds. The other sherds with grit and plant are tempered with unidentified stone material. The second largest group of sherds has only grit temper (365 sherds; 22.4%). Of these, 114 sherds are tempered with quartz and 72 with granite. The third largest tempering group has only plant tempering (96 sherds; 5.9%). There are 16 plant-tempered sherds with an admixture of grog.[6]

For all grit-tempered sherds, both the density and average particle size of the grit were estimated. Table 3.3 presents the correspondence between these variables. A general conclusion is that most grit-tempered sherds were tempered in low to average densities, with 1-2 mm temper particles. A subdivision within the quartz and granite tempered sherds indicates some subtle differences. The highest percentages for quartz-tempered sherds are found for low density and 1 mm particle size, while for granite tempered sherds the highest values are found for average density and 2 mm.

Coiling

The pottery was built up from coils that were connected by two types of joins (fig. 3.1), namely, U-joins (perpendicular in cross-section; Dutch: *H-rollen*) and Hb-joins (slanting in cross-section; Dutch: *N-rollen, Z-rollen*). The type of join was determined for 26.6% of the sherds. The most common type of join are the Hb-joins (67.2%), while U-joins make up the remainder (32.8%). There is no correlation between the type of join used and the thickness of the sherds.

1 d.c.m.raemaekers@rug.nl; University of Groningen / Groningen Institute of Archaeology; Poststraat 6, 9712 ER Groningen, the Netherlands.
2 bemboom@wxs.nl; drs. J.W. (Willem) Bembom; Stationsweg 33, 7731 AX Ommen, the Netherlands.
3 s.dresscher@rug.nl; University of Groningen, Arctic Centre / Groningen Institute of Archaeology; Aweg 30, 9718 CW Groningen, the Netherlands.
4 A.M. Koops-Besijn; Kiel-Windeweer, the Netherlands.
5 esterhofman84@gmail.com; Universitetet i Stavanger / Arkeologisk Museum; Peder Klows gate 30A, Stavanger, Norway.

6 Mica was identified in several sherds. Mica is not considered a tempering agent here, because it occurs naturally in the Swifterbant clay.

Table 3.1 Provenance of the S4 ceramics.

Excavation	Context	N described sherds
1974	No spatial information	124
2005-2007	Spits	1417
2005-2007	3D-measured	43
2005-2007	Features	12
2005-2007	Field	8
2005-2007	No context	22
Total		**1626**

Table 3.2 Temper groups.

Temper	N	%
Quartz	114	7.0
Quartz & grog	5	0.3
Quartz & plant	283	17.4
Quartz. grog & plant	2	0.1
Stone grit	179	11.0
Stone grit & grog	10	0.6
Stone grit & plant	532	32.7
Stone grit. grog & plant	7	0.4
Granite	72	4.4
Granite & grog	3	0.2
Granite & plant	290	17.8
Granite & bone	2	0.1
Granite. grog & plant	3	0.2
Grog	2	0.1
Grog & plant	16	1.0
Plant	96	5.9
No temper	10	0.6
Total	**1626**	**100.0**

Vessel wall thickness

The wall thickness of the ceramics varies between 5 and 25 mm; the average thickness is 10.8 mm. The thickness displays a unimodal distribution: there is no evidence of fine ware and coarse ware. There appears to be variation in wall thickness in relation to tempering. Sherds with only quartz temper have an average thickness of 10.1 mm, sherds tempered with only granite have a thickness of 10.6 mm, and sherds tempered with only plant have a thickness of 11.1 mm. This variation is a first clue that the ceramic assemblage may comprise sub-assemblages that can be distinguished based on interrelated variables.

Surface finish

The surface finish of the pottery is very uniform (table 3.4). Most sherds have a smooth surface. Only a small percentage have an uneven, rough, or polished surface or are finished with *Besenstrich* (whereby the still-wet surface was brushed with some grass).

Table 3.3 Correspondence between stone grit density and particle size.

	Stone grit density			
Temper size	**Low**	**Average**	**High**	**Total**
1 mm	40.9	6.6	0.8	**48.3**
2 mm	19.7	20.1	1.6	**41.4**
3 mm	2.8	4.6	1.3	**8.7**
> 3 mm	0.3	0.9	0.3	**1.6**
Total	**63.7**	**32.2**	**4.1**	**100.0**

	Quartz density			
Temper size	**Low**	**Average**	**High**	**Total**
1 mm	32.4	9.7	0.7	**42.8**
2 mm	27.5	15.8	2.5	**45.8**
3 mm	4.0	4.5	2.2	**10.6**
> 3 mm	0.0	0.7	0.0	**0.7**
Total	**63.9**	**30.7**	**5.4**	**100.0**

	Granite density			
Temper size	**Low**	**Average**	**High**	**Total**
1 mm	18.9	7.3	1.1	**27.3**
2 mm	23.5	34.3	1.1	**58.9**
3 mm	3.0	7.0	1.4	**11.4**
> 3 mm	0.5	1.6	0.3	**2.4**
Total	**45.9**	**50.3**	**3.8**	**100.0**

Table 3.4 Ceramic surface finishing techniques.

Surface	N	%
Smoothed	1325	84.0
Roughened	195	12.4
Uneven	41	2.6
Polished	10	0.6
Besenstrich	7	0.4
Total	**1578**	**100.0**

Decoration

There are 44 decorated body sherds (2.9%). Of these, 20 have spatula impressions in three variations: nine have single impressions, eight have double impressions and three have multiple impressions (fig. 3.1). Three sherds have hollow spatula impressions, and two sherds have paired fingertip impressions. Grooves were observed on ten sherds; in eight cases it was not possible to say what instrument was used. The decoration was carried out in rows on either shoulder (14 instances) or the body (18 instances). For 11 cases it was not possible to locate the position of the sherd within the pot.

There are 115 rim sherds, of which 47 are decorated (41%). Of these decorated sherds, 22 are decorated on the top, 20 on the inside and 2 on the outside. Two sherds are decorated on both the inside and the top, and one sherd is decorated on the inside, top and outside. Rim decoration was mostly created

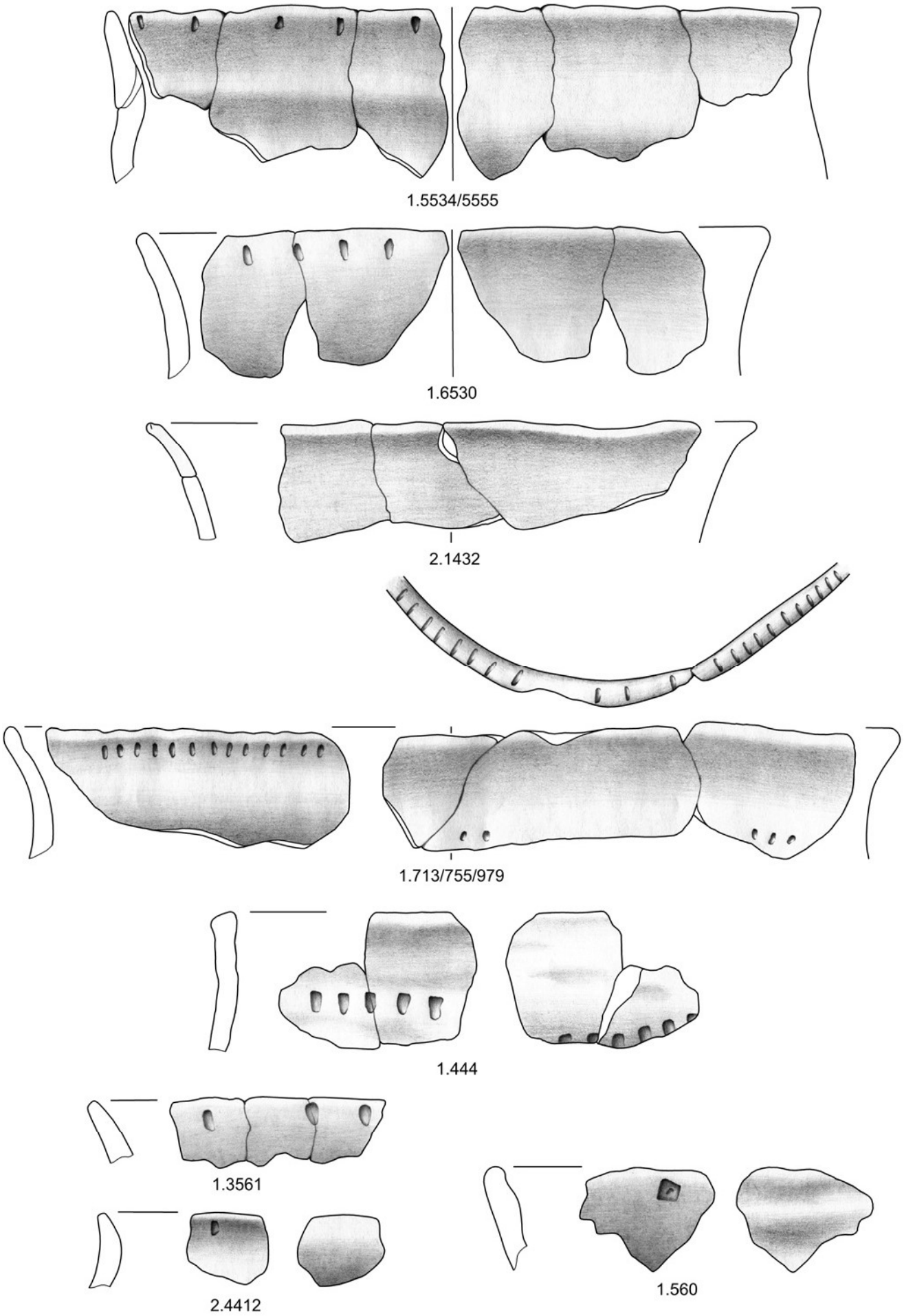

Fig. 3.1a Examples of ceramics from S4. Scale 1:2 (drawings M.A. Los-Weijns, UG/GIA).

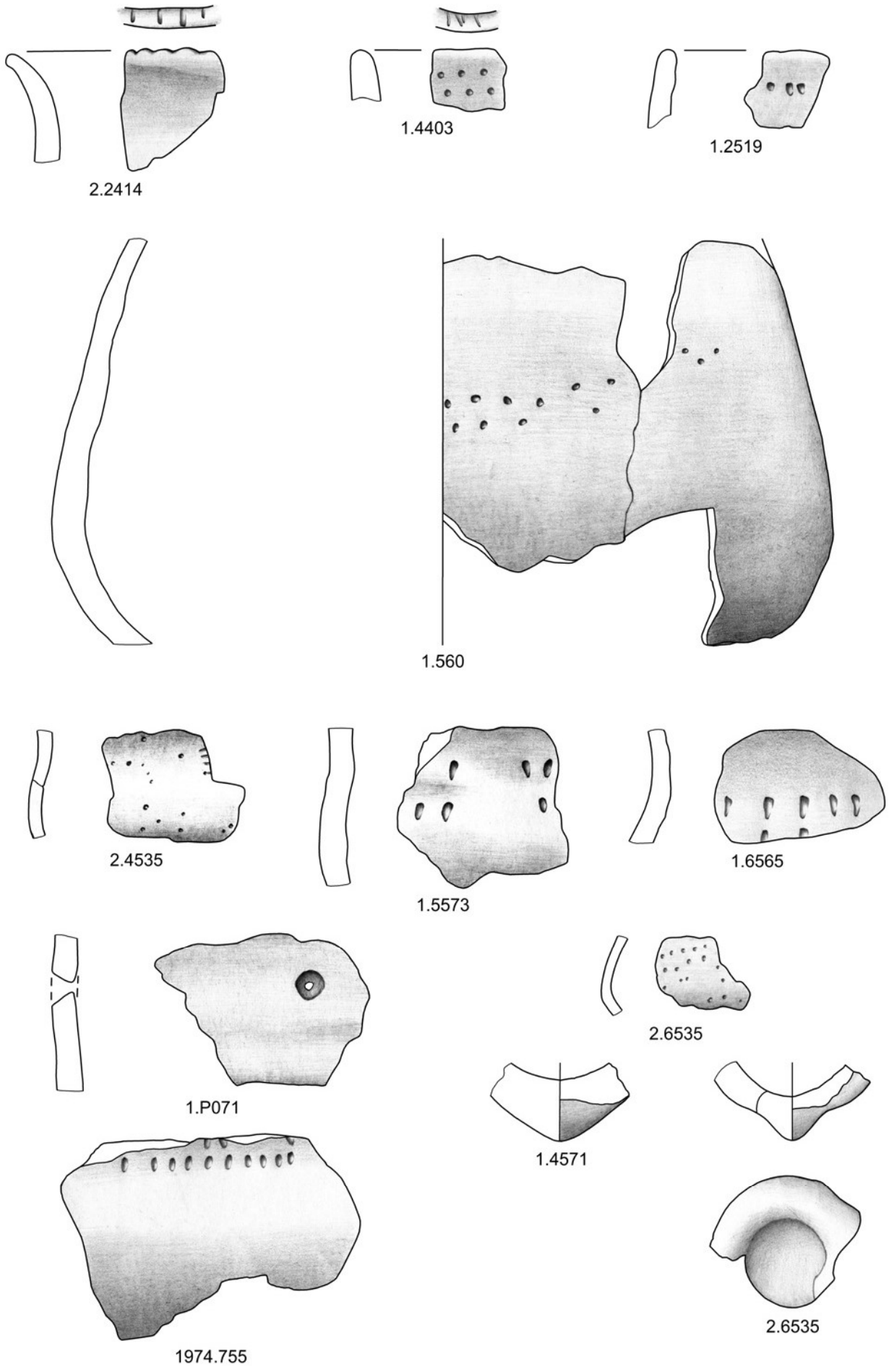

Fig. 3.1b Examples of ceramics from S4. Scale 1:2 (drawings M.A. Los-Weijns, UG/GIA).

Table 3.5 Correlations between ceramic decoration frequency and tempering agents.

Temper	All body sherds	Decorated body sherds	
	N	N	%
Quartz	113	0	0.0
Granite	70	0	0.0
Stone grit	159	9	5.7
Plant	87	5	5.7
All sherds	**1510**	**44**	**2.9**

Temper	All rim sherds	Decorated rim sherds	
	N	N	%
Quartz	8	4	50
Granite	4	3	75
Stone grit	21	11	52
Plant	9	3	33
All sherds	**117**	**47**	**40**

with spatula impressions (29 instances). There are two sherds with *Randkerbung* (a series of small impressions on the top surface of the rim created by means of a fingernail or small instrument), and six have wavy rims. Five rim sherds were decorated using fingernail or fingertip impressions, while two rim sherds show a combination of techniques.

There is a correlation between tempering agents and the frequency of decoration (table 3.5). While 2.9% of the body sherds overall are decorated, sherds tempered with only quartz or granite show no decoration at all. In contrast, 5.7% of the sherds only tempered with undetermined stone grit and of sherds only tempered with plant were decorated. The rim sherds, which are fewer in number, lead to a more general conclusion: sherds tempered with plant only are less often decorated than sherds tempered with any kind of stone temper. These patterns are a second indication that there are subgroups in the assemblage.

Firing conditions

The colour of the cross-section of the sherds may be indicative of the presence of oxygen during the firing of the pots. The cross-sections vary in colour. With a total of 1609 determinations, 34.6% have a light-dark-light cross-section, indicative of a first firing phase with low oxygen levels and a final firing phase rich in oxygen. A dark-dark-light cross-section (with light being the outside of the pot) was found on 28.1% of the sherds, while completely dark (18.9%) and completely light (10.4%) cross-sections occur in significant frequencies as well. The remainder of the sherds (7.9%) have different cross-sections.[7] The wide variation in colour makes clear that the potter did not control the influx of oxygen.

Table 3.6 Correlation between vessel wall thickness and presence of charred food remains.

Ware	N	N with food residue	% with food residue
Fine ware (5-9 mm)	415	94	22.65
Medium ware (10-12 mm)	881	198	22.47
Coarse ware (13-25 mm)	272	44	16.18

Morphological evidence

It is typical for settlement sites , at Swifterbant but also in general, that it is difficult to refit the pottery sherds into larger pottery fragments. Part of the problem lies in the generally more homogeneous character of the sherds. But the more distinctive sherds make clear that major parts of the pots are lacking from the assemblage. This observation suggests that the use history of pottery is more complicated than the present dichotomy between intact (in use) and broken (discarded). Missing parts may have ended up on other sites or as tempering agent in new pots. The pottery may be characterized as S-shaped, with rim diameters of 23-32 cm. Base forms are varied and include round bases (4 instances) and pointed bases (2 instances) (fig. 3.1: 6535 and 4571).

Repair holes

There are seven sherds with repair holes. These hourglass-shaped holes were created after firing, probably to facilitate the repair of fractures.

Charred food remains

Charred food remains are found on 462 sherds (28.5%), mostly only on the inner face (278 instances), but also only on the outer face (106 instances) or on both faces (78 instances). These food residues make clear that most if not all of the Swifterbant S4 pottery was used for cooking. In order to investigate the hypothesis that thin-walled ceramics were table ware and not used for cooking, the correlation between wall thickness and the occurrence of charred food remains is tabled in table 3.6. It is concluded that the hypothesis cannot be substantiated because the percentage of thin-walled sherds with charred food remains is similar to that of sherds

7 These sherds are light-light-dark (0.7%), dark-light-light (2.2%), dark-light-dark (0.4%) and light-dark-dark (4.5%) in cross-section.

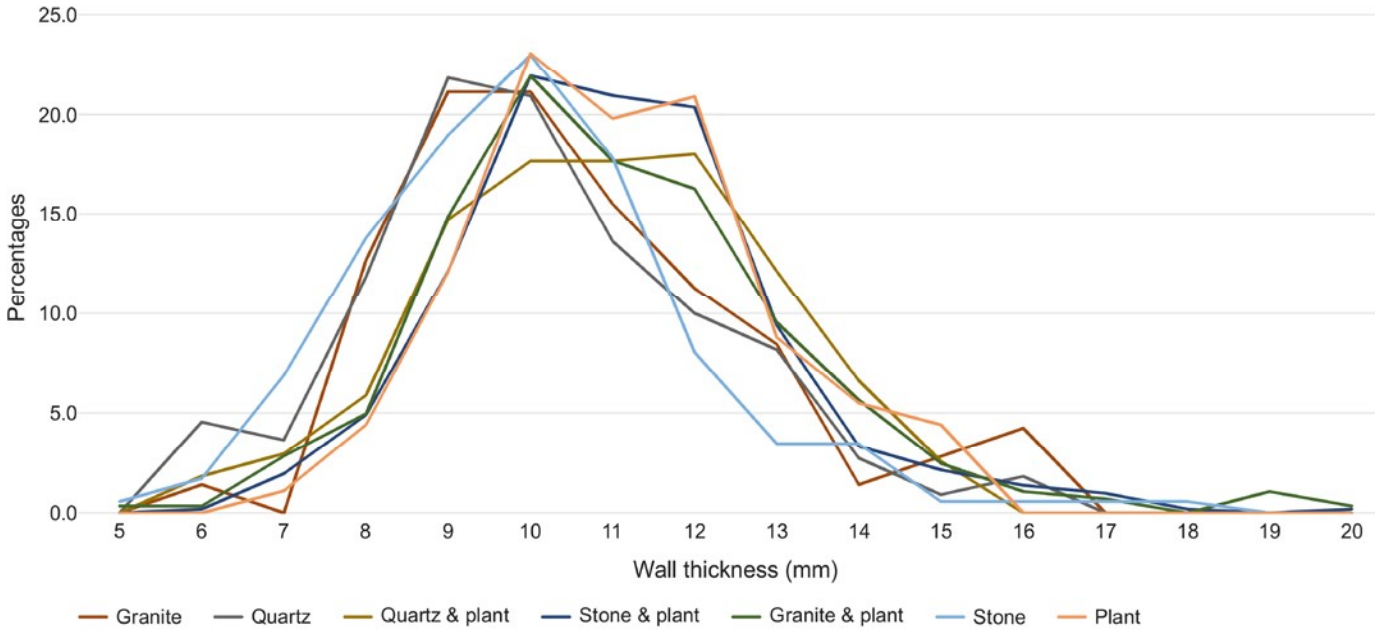

Fig. 3.2 Correlation between wall thickness and temper (diagram D.C.M. Raemaekers, UG/GIA).

with medium wall thickness. Noteworthy is that thick-walled sherds less frequently have adhering charred food remains. More often than the thinner sherds, these sherds may be the remnants of the lower part of a pot. One might suppose that in the cooking process, fluid remained in the lower part of the pot, prohibiting the charring process here.

Ceramic subgroups?

The analysis of the correlations between the variables suggests that there is variation in this assemblage based on temper, wall thickness and proportion of sherds that have decoration. Fig. 3.2 presents this correlation in a graphic way. In general, the wall thickness curves of the seven largest temper groups are very similar. However, when viewed in close detail, it becomes clear that sherds tempered with stone (granite, quartz or undetermined stone grit) are relatively more abundant among sherds with a wall thickness of 8-9 mm, compared with the four other curves, which all have plant temper, in three instances combined with a type of stone temper. For sherds with a wall thickness of 11-13 mm, this trend is reversed. This pattern is not repeated in the percentage of body decoration. The sherds tempered with only granite or quartz are all undecorated, while 5.7% of the sherds tempered with an undetermined type of stone and 5.7% of the sherds tempered with only plant are decorated. The other temper groups have percentages that are intermediate between these values. The significance of these observations is discussed in section 4, where the S4 assemblage is compared with the assemblages from the other Swifterbant levee sites.

3.3 Trends

This section studies the possibility of subdividing the assemblage into units of analysis corresponding to phases of occupation. There are two ways to define such units. The first is to use refits between sherds in different contexts to indicate which parts of the assemblage may be contemporaneous. Despite intensive refitting efforts, no refits were found other than in neighbouring squares from the same spit. The second approach is to study developments in ceramic variables from the lowest spit, spit 9) and the sherds from the underlying agricultural field, all the way up to the sherds from spit 1. We realize that this approach is of little absolute value, given that De Roever has already pointed out for neighbouring site S3 that sherds from a single pot may be found across an area of several square meters and, more importantly, across several spits (De Roever, 2008: especially figs. 3-5). The aim of the analysis proposed here is not to define absolute occupation phases, but, rather, to propose spatially defined units of analysis which allow for the study of trends in material culture and ecological remains. Three units have been defined.

- Unit 1: the youngest part of the stratigraphy: spits 1-3;
- Unit 2: the middle part of the stratigraphy: spits 4-6;
- Unit 3: the oldest part of the stratigraphy: spits 7-9 and the underlying cultivated field.

The proportional importance of the different tempering agents is more or less the same throughout the finds layer (table 3.7), but this statement can be nuanced with some additional remarks.

Table 3.7 Break-down of the ceramic assemblage for the three units: Unit 1 (top), Unit 2 (middle) and Unit 3 (bottom).

		Total	Unit 1	Unit 2	Unit 3
Total sherds (N)		**1418**	**433**	**845**	**140**
Total squares (N)		**2547**	**1236**	**908**	**403**
Sherds per square (N)		**0.56**	**0.35**	**0.93**	**0.35**
Temper	Stone grit & plant (%)	32.7	27.0	32.4	30.8
	Granite & plant (%)	17.8	16.8	17.5	24.1
	Quartz & plant (%)	17.4	24.9	16.4	12.8
	Stone grit (%)	11.0	11.1	11.2	9.8
	Quartz (%)	7.0	6.6	8.5	1.5
	Plant (%)	5.9	8.4	4.9	6.8
	Granite (%)	4.4	3.4	5.7	3.8
	Other (%)	3.7	1.8	3.4	10.5
Coiling	Coiling visible (%)	24.4	23.8	22.7	36.4
	U-joins (%)	34.4	42.7	35.4	13.7
	Hb-joins (%)	65.6	57.3	64.6	86
Body	Body sherds (N)	1241	336	674	114
	Decorated body sherds (N)	44	7	24	6
	Body decoration (%)	3.5	2.1	3.6	5.3
	Of which on shoulder (%)	45	57	25	33
Rim	Rim sherds (N)	114	34	56	10
	Decorated rim sherds (N)	45	12	23	4
	Rim decoration (%)	40	35	41	40
	Of which on inner face (%)	42	8	61	25
	Of which on upper face (%)	49	67	30	75
	Of which on outer face (%)	4	8	0	0
	Of which on more than one face (%)	7	17	9	0

The combination of granite and plant as temper is relatively abundant in Unit 3, and it increases throughout the occupation. Sherds tempered with only quartz are relatively rare in Unit 3.The pottery was built up from coils using U-joins and Hb-joins. In Unit 3, coil-building was recognised more frequently, which might indicate that the coiling technique was carried out less precisely in the earlier stages of occupation. This corresponds to a predominance of the Hb-coiling technique in this unit. Body decoration, while rare, does show some trends. First, body decoration becomes steadily less frequent during the occupation. Second, the relative popularity of shoulder decoration increases by Unit 1. It is frequent in spits 1-3, less frequent in spits 4-5 and more again frequent in spits 6-7. Patterns in rim decoration cannot be ascertained due to the limited number of sherds with rim decoration. The presence of some trends in sherd characteristics suggests that the assemblage of the finds layer as a whole is not a complete mixture and that the three units within it can be used to study developments in other categories of material culture and subsistence.

The density of sherds, expressed as the number of described sherds per excavated square, varies considerably, with Unit 2 having triple the find density of Units 1 and 3. Potentially, there are two explanation for this. It may result from a more intensive use of the site during the formation of Unit 2. Or it may relate to a decrease in the rate of accumulation of the reed layer. This issue will be discussed in later chapters and in the conclusion.

3.4 Comparison

The S4 assemblage presented here is not the first assemblage of Swifterbant pottery from the area that has been analysed. The neighbouring levee sites S2 and S3 yielded substantial assemblages, studied and published by De Roever (1979; 2004), while a sample of S2 and S3 was studied and published by Raemaekers (1999). We compare the S4 assemblage with the two samples studied by Raemaekers (table 3.8) because these were described using the same descriptive system. A quantitative comparison with De Roever's publications is more difficult.

During his analysis of the S2 and S3 samples, Raemaekers did not look into the type of stone used as tempering material. To allow for a comparison of tempering materials between the two studies, the three types of stone temper identified at S4 were combined into one temper group. The proportion of sherds tempered with only plant is the most striking difference, being dominant at S3 and very restricted

Table 3.8 Comparison of the ceramics from the Swifterbant levee sites S2, S3 and S4.

		S4	S2	S3
Total sherds (N)		1418	380	400
Temper	Stone grit & plant (%)	67.9	36	28
	Stone grit (%)	22.4	20	5
	Plant (%)	5.9	43	67
	Rest (%)	3.7	0	0
Coiling	Coiling visible %	24.4	25	17
	U-joins (%)	34.4	84	82
	Hb-joins (%)	65.6	16	18
Body	Body sherds (N)	1241	380	400
	Decorated body sherds (N)	44	8	41
	Body decoration %	3.5	2	10
	Of which on shoulder (%)	45	100	65
Rim	Rim sherds (N)	114	7	74
	Decorated rim sherds (N)	45	3	43
	Rim decoration %	40	43	58
	Of which on inner face (%)	42	100	60
	Of which on upper face (%)	49	0	7
	Of which on outer face (%)	4	0	28
	Of which on more than one face (%)	7	0	5

Table 3.9 Correlation among temper, wall thickness and decoration frequency for the ceramics from the Swifterbant levee sites S2, S3 and S4.

	S2 (N = 380)		
	Plant	**Plant & stone**	**Stone**
Number	179	129	72
Average wall thickness (mm)	9.2	9.2	9.0
Body decoration (%)	6	6	1
Rim sherds (N)	17	20	7
Rim decoration (%)	35	30	43

	S3 (N = 400)		
	Plant	**Plant & stone**	**Grit**
Number	259	110	19
Average wall thickness (mm)	10.5	9.9	9.7
Body decoration (%)	10	3	5
Rim sherds (N)	52	19	2
Rim decoration (%) (n/total)	48	79	100

	S4 (N = 1626)		
	Plant	**Plant & stone**	**Grit**
Number	112	1200	385
Average wall thickness (mm)	11.1	11	10.1
Body decoration (%)	5	3	2
Rim sherds (N)	9	77	33
Rim decoration (%) (n/total)	33	35	54

in importance at S4. S2 and S3 are rather similar in the proportional occurrence of the combination of stone grit and plant, while S2 and S4 are more similar in terms of tempering with only stone grit. Coiling is visible a on very similar percentage of sherds, suggesting that the potters had similar notions about how firmly a new coil should be pressed onto the preceding coil. S4 does stand out in terms of its high proportion of Hb-joins. The popularity of body decoration differs among the sites as well, with S3 scoring much higher than S2 and S4. S2 stands out in terms of the importance of decoration on the shoulder, but this may be a result of the small number of decorated body sherds. The figures relating to rim decoration should be approached with great caution due to the small numbers involved. They testify to large intersite variation. This may be interpreted in two ways. The first is that the potters involved had very different ideas about tempering, albeit within a shared framework defined by the use of plant and stone grit. The second option is that this variation is related to function.

Ceramic subgroups?

One of the intriguing results of our analysis is the suggestion that there are two subgroups of ceramics in the S4 assemblage based on correlations among temper, wall thickness and decoration. Table 3.9 presents the results of similar queries conducted on the S2 and S3 databases. It is striking that, although the numbers differ, all three assemblages show the same correlations. This suggests that the potters at Swifterbant had two slightly different templates to work from. It might be envisaged that these two

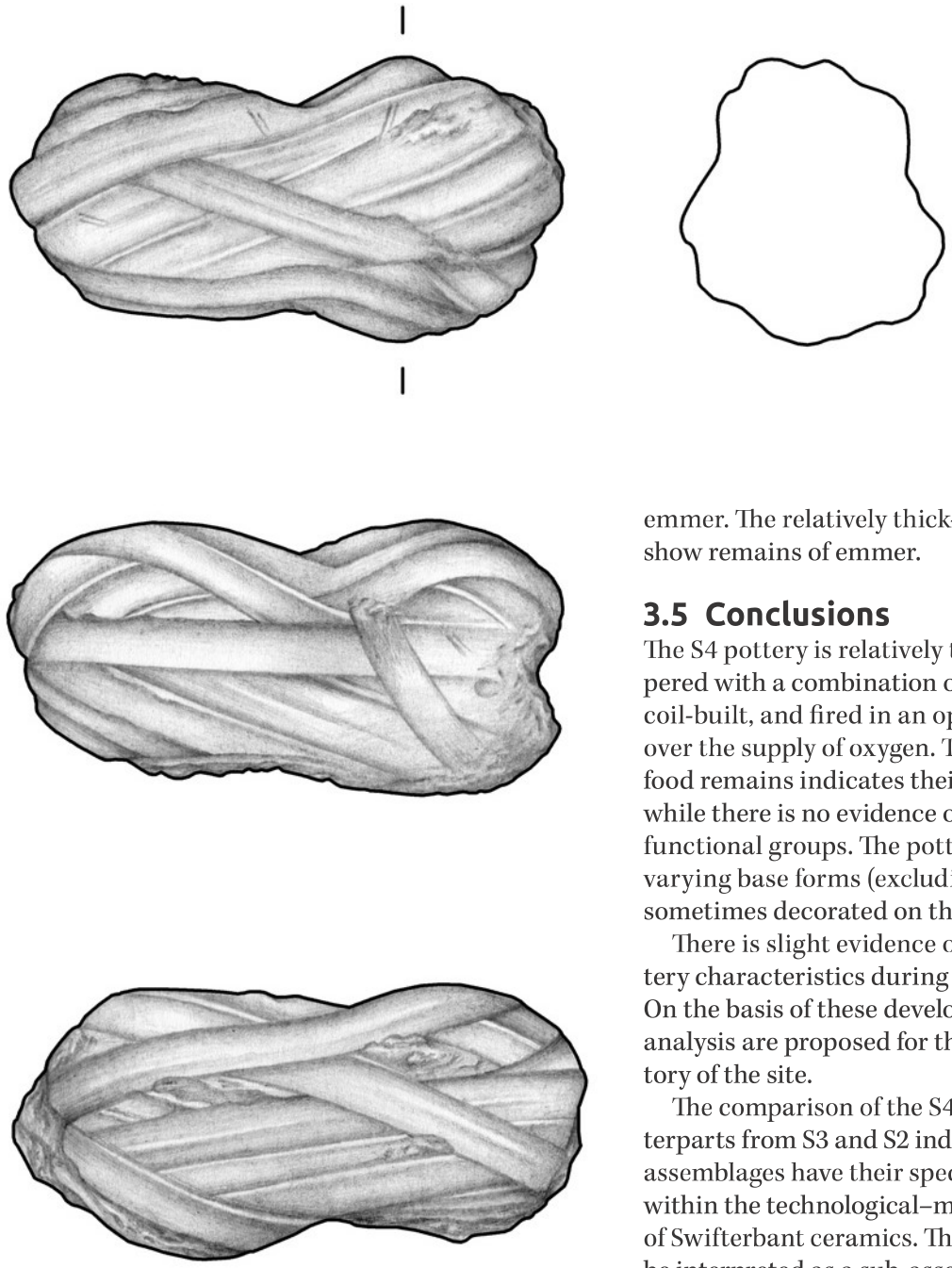

Fig. 3.3 Ceramic object. Scale 1:1 (drawing M.A. Los-Weijns, UG/GIA).

templates correspond to two micro-traditions, that is, two groups of potters at work in the area. The produce of their work then found its way to all known sites in the Swifterbant region.[8] Another option is that these patterns relate to functional differences. On the basis of these patterns, a functional analysis was carried out on a selection of ceramics from S3 using lipid and scanning electron microscopy (SEM) analyses, which suggested (Raemaekers *et al.,* 2013) that the relatively thin-walled pots, tempered with stone grit, were used for meals with emmer. The relatively thick-walled pots did not show remains of emmer.

3.5 Conclusions

The S4 pottery is relatively thick-walled, mostly tempered with a combination of grit and plant material, coil-built, and fired in an open fire with little control over the supply of oxygen. The presence of charred food remains indicates their use as cooking vessels, while there is no evidence of table ware or other functional groups. The pottery is S-shaped, has varying base forms (excluding flat bases), and was sometimes decorated on the rim or the shoulder.

There is slight evidence of developments in pottery characteristics during the site's occupation. On the basis of these developments, three units of analysis are proposed for the study of the use history of the site.

The comparison of the S4 pottery with its counterparts from S3 and S2 indicates that all three assemblages have their specific characteristics within the technological–morphological framework of Swifterbant ceramics. The S4 assemblage cannot be interpreted as a sub-assemblage of the S3 assemblage, despite the close proximity of the sites. The analysis suggests, based on the correlation between temper, wall thickness and decoration frequency, that the assemblage comprises two subgroups. These two subgroups were found at the neighbouring sites S2 and S3 as well and probably relate to different meals having been produced in different pots.

3.6 A ceramic object

The excavation yielded one singular ceramic object, found in square 5531, without any other special artefacts nearby. It concerns a peanut-shaped object with a length of c. 8.1 cm and a maximum diameter of c. 4.1 cm (fig. 3.3). The clay is untempered, and when wet, it had been covered with strings of plant material. At a later point in time, the object was fired, preserving the imprint of the plant material. This object will be published in detail elsewhere (Raemaekers *et al.,* in prep.).

8 Similar micro-traditions are proposed for the somewhat younger Hazendonk group (Raemaekers, 2008).

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